TALLAHASSEE AREA
MINIMUM TEMPERATURE STUDY
Monthly Report-June 2002

National Weather Service-Tallahassee
Department of Meteorology, Florida State University

Introduction

This is the seventh monthly report describing minimum temperatures in the Tallahassee area. It is part of a long term joint research project between the National Weather Service in Tallahassee and the Florida State University Department of Meteorology.

June 2002

This month was slightly warmer and noticeably drier than normal and follows a similar pattern to that of the previous two spring season months. The average minimum temperature at the Tallahassee Regional Airport during June 2002 was 70.0 degrees, compared to the 30-year June average of 68.9 degrees. The airport recorded only 3.20 inches of rain with 1.37 inches with 45 percent of the total monthly precipitation falling on the 26th. The June normal is 6.82 inches. During the April-June period, cumulative airport rainfall was 10.12 inches below normal. Twenty observers participated in the study, and their locations are indicated on the map (Figure 1). The observer locations represent a wide spatial distribution across Leon County.

1. TALLAHASSEE AREA JUNE 2002 REVIEW

Table 1 gives daily minimum temperatures as well as means and standard deviations for each location in the network. These data can be used to compare any site with the other nineteen. The coolest airport reading occurred on June 16th when minimums dropped to 60.6 degrees. Cool nights also were noted on the 1st, 10th, and 28th-29th. The mildest readings were noted on the 4th-6th and the 14th when minimums remained above 72 degrees. The only significant frontal system this month occurred on the 23rd-27th. A warm front slowly approached and then traversed the area on the 23rd-25th producing onshore winds, fog and 0.63 inches of rain at the airport. In its wake, a cold front crossed on the 26th and early on the 27th dropping an additional 1.46 inches. Winds increased as they veered initially to the northwest on the 27th and then to the northeast on the 28th. Skies cleared, and visibilities became unrestricted. However, unlike frontal passages during the preceding six cooler months, temperature ranges prior to, during and after this event demonstrated little daily variation. They remained in the single digits, 3-5 degrees with the warm front and 6-8 degrees with the cold front. This was consistent with ranges displayed on the other coolest days of the month. These ranges are noticeably lower than in May when the mildest nights were 8-11 degrees, and the coolest nights were 10 to 15 degrees. As expected, the disparity in

daily ranges was even greater between June and the four winter months. Significantly, daily ranges remain above average for Tallahassee when compared to other small cities .

2. JUNE 2002 MINIMUM TEMPERATURE EVALUATION

Figure 2 is a station histogram which shows how your site ranks in comparison to the other nineteen sites during June 2002.

Table 2, labeled “Frequency of Extremes”, demonstrates another way to view the data. It is more informative than simple raw data or rank histograms, telling how many times (and the percentage of times) that your station ranked as one of the coldest or warmest four sites on a particular day.

a) Coldest and warmest sites

Four of the five coldest sites during June also were the coldest during the previous months of this study. These are (in order) Canopy, Elsner, McCool, Oak Ridge and Lundy. Elsner (the sixth coldest in April) replaced Binkley. Likewise, four of the five warmest sites this month were the same as those during the previous months. These include (in order) Brogan, Winsberg, Wakulla, TLH, and Bellenot. TLH replaced FSU (which is now the 6th warmest). All but Wakulla and TLH are located in or near downtown, in areas dominated by artificial surfaces, especially asphalt, as well as the counties tallest buildings. All these factors serve to decrease wind speeds, retard outgoing radiation and enhance the greenhouse effect; thereby moderating nighttime minimums. These data substantiate the significant ranges between the downtown area and the more rural suburbs. The monthly consistency in the spatial distribution of cold and warm sites continues to validate the data presented.

b) Topography, natural surfaces and soil type

Although late spring/early summer temperature ranges were around one half those of the winter, the results continue to show larger than expected daily temperature variations associated with the Tallahassee urban heat island. As with all previous months, the five coldest sites were located away from downtown with four of them in the most rural parts of the county where natural surfaces dominate. Two are in the northwest, one each in the east, south and southwest quadrants. As indicated in previous reports, the spatial distribution of topography and soil type likely influences temperature distribution. The majority of the coolest sites in June were situated in the west or more hilly half and/or across the south and southwest quadrant of Leon County. In the south, sandy soils predominate which are more effective emitters of radiation than the prevailing area clay soils. However, unlike previous months, there was a somewhat more uniform cool temperature distribution, most evidenced east of downtown, with previously warmer sites like Elsner and Nayak ranked near the top during cooler events. Future reports will determine if this is an anomaly, or indicative of a warm season trend.

c) Wind speed and direction

The June data continue to validate classical urban heat island studies which indicate that minimum temperatures generally decrease as you move away from the city center. Perhaps of greater interest is the spatial distribution of cold sites during and after a frontal passage. During a frontal passage and the day after, when speeds from the northwest and north are strongest, a few locations in the northwest through northeast quadrants, which are not normally cold, rank among the coldest for that day. This includes WCTV (310 feet) located on north or windward facing slopes and, generally, on some of the counties highest elevations. However two days later, when winds typically diminish and radiational cooling dominates, the distribution of coldest sites becomes more evenly distributed and also includes Binkley and Venable located in relatively low spots south of downtown. The distribution is no longer based largely on wind speed and direction, but more on distance from downtown, the amount of natural surface, topography and soil type.

d) The Tallahassee Airport (TLH)

During June, the Tallahassee airport was one of the warmest four sites 37 percent of the time, but was never one of the coldest. During the seven month study period (December-June), it was one of the warmest sites 24 percent and coldest only 5 percent of the time, with the warm percentage increasing and cold percentage decreasing as one goes from winter to spring to summer. This continues to substantiate that, contrary to popular belief, the airport does not represent a cold valley in area temperatures. June readings imply that, in fact, it may be represent a warm anomaly, especially for the warmer season. Minimum temperature forecasts for Leon County must address this seasonal variation.

Summary

This is the seven month of collecting Tallahassee area minimum temperature data including all of winter 2001-2002, plus the spring and the initiation of the summer 2002 season . During June, daily temperature ranges, (for cold vs mild nights and under varying synoptic conditions), were less than but comparable with those of May. Although temperature ranges during June, as well as for the entire April-June season were noticeably less than during the winter months, they remain above average for a city of this size. Therefore, the notion that the warmer spring would negate these temperature ranges has been hinted at but has not been validated. Rather, the data continue to imply that the Tallahassee urban heat island is more complex, and the minimum temperature ranges are significantly more varied, than previously anticipated. Although temperatures generally decrease with distance from downtown, several factors can alter this circular distribution. In particular, the daily spatial distribution of coldest temperatures appears to be related to synoptic factors, including the effect of frontal and post-frontal weather as well as topography, soil and land use type. Significantly, June data hint that warm season dynamics may alter the spatial distribution of coldest temperatures as well as temperature ranges. Future reports will

investigate the reasons for this in more detail.

As with any longer-term study, the current study has experienced a minor turnover of observers. Therefore, the coordinators of this study would like to solicit new observers to compliment the existing data base insuring a monthly geographical balance across Leon County. Anyone interested in participating in this study should contact Ron Block at ron.block@noaa.gov or 850-942-8833.